

THESIS/REPORTS
TERRELL, T. T.

~~LIBRARY~~
~~FOREST BIOLOGY LABORATORY~~
~~VICTORIA, B.C.~~

US
FS
IFRES
Misc.
68

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
Intermountain Forest and Range Experiment Station
REED W. BAILEY, DIRECTOR

Ogden, Utah

November 4, 1955

LIBRARY
PACIFIC FOREST RESEARCH CENTRE
506 WEST BURNSIDE ROAD
VICTORIA, B.C.

DEFOLIATING INSECTS IN 1955
SOUTHWESTERN YELLOWSTONE NATIONAL PARK
IDAHO AND WYOMING

By Tom T. Terrell and Harold R. Dodge, Entomologists

Prepared By The
Forest Insect Laboratory
Missoula, Montana

DEFOLIATING INSECTS IN 1955
SOUTHWESTERN YELLOWSTONE NATIONAL PARK
IDAHO AND WYOMING

Introduction

The first report of budworm injury to lodgepole pine in Yellowstone National Park was by Balch¹, who made a careful study of a large infestation in the late 1920's, centering at the Bechler River Ranger Station. His insect was identified as Cacoecia (now Choristoneura) fumiferana var. lambertiana. He reported that the black-headed budworm, Acleris variana (Clem.), was a more serious pest of fir and spruce than the spruce budworm in this area.

Other defoliating pests of lodgepole pine have been known for many years in the Yellowstone Park region. Keen² states (page 119) that the lodgepole sawfly, Neodiprion burkei Midd., "developed a severe outbreak in 1921 over a large area of lodgepole pine at West Yellowstone, Montana. In the next few years a tremendous acreage of lodgepole pine was defoliated and a large percentage of the trees died. This outbreak was further complicated by a contemporary outbreak of the pine tube moth." Two other species of caterpillars are recorded by the same author as defoliators of lodgepole pine; they are the lodgepole needle miner (Recurvaria milleri Busck) and the jack pine needle miner (Zelleria haimbachi Busck). The former is recorded (page 109) as defoliating "extensive areas of lodgepole pine in California, Idaho, Montana, and Alberta, Canada" and the latter is possibly the species found to have infested large areas of lodgepole pine in the Swan Valley of the Flathead Forest, Montana in 1955 (Unpublished Laboratory survey records).

1/ Balch, R. E. The spruce budworm epidemic on lodgepole in Wyoming. Unpublished report, Bureau of Entomology and Plant Quarantine, Forest Insect Laboratory, Coeur d'Alene, Idaho. April 5, 1930.

2/ Keen, F. P. Insect enemies of western forests. U. S. Department of Agriculture, Miscellaneous Publication No. 273. Revised July, 1952.

Current reports of defoliation of lodgepole pine and alpine fir were made by Ranger Charles A. Budge, at the Bechler River Ranger Station, Yellowstone National Park. The Forest Insect Laboratory was notified, and the decision was made to aerially map this infestation and to make ground examinations to determine the exact kind or kinds of insects involved.

Infestations by defoliators are not new in the Bechler area. Balch (1930) reported "a considerable infestation . . . (in 1928) in a pure stand of lodgepole pine around the southwest corner of Yellowstone Park", and that in 1929 the outbreak covered some 75 square miles. Similar outbreaks of a lesser extent were noted from time to time in subsequent years. In 1947-48 approximately 17,000 acres were infested south of the Park in the Targhee National Forest. All of these previous infestations seemed to have centered around an area just south of the Park boundary, often in the vicinity of Loon Lake in the Forest.

Aerial Survey

An aerial survey was made in the southwestern part of Yellowstone National Park on September 13 and 14, 1955 by Tom T. Terrell and J. Edwin Morse of the Laboratory. The infestation was found to be located mostly in two large areas separated by the Bechler River canyon in Bechler Basin (figure 1). The defoliation of lodgepole pine was very difficult to detect, since the terminals of the trees were a healthy green color. However, with close observation when flying as low as possible, a discoloration of the lower foliage was observed. The alpine fir, on the other hand, had the usual appearance of light budworm feeding, with discolored needles most evident in the upper crowns of the trees.

Ground Examination

The infested area about 10 miles north of the Bechler River Ranger Station was examined by Entomologist Harold R. Dodge and Ranger Charles A. Budge, October 11, 1955. Scattered feeding on lodgepole pine was observed north of the patrol cabin and on a ridge north of Silver Scarf Falls defoliation of both lodgepole pine and alpine fir was found.

The lodgepole defoliation was similar to that observed by Dodge at Excelsior Geyser in the Park, August 7, 1955. Only the older needles are destroyed, the feeding usually progressing from the tips of the needles back. Sometimes, however, the needles are partly severed near their base, which causes the apical part to turn brown. The

causative agent at Excelsior Geyser was found to be larvae of a sawfly, possibly the lodgepole sawfly, Neodiprion burkei Midd. Larvae were very scarce at that time, but still feeding on the older foliage, though the 1955 foliage was well advanced. At Bechler Basin no larvae were found, and snow impeded the search for cocoons, which was not successful.

The alpine fir was defoliated by a budworm, probably the black-headed budworm, Acleris variana (Ferm.). Feeding was confined to the current year's growth and especially noticeable on the upper part of the crown, as is the case with Choristoneura feeding. However, the pupal shells indicate a much smaller insect, with different pupal characters. Feeding was especially heavy on alpine fir, with only little damage to Douglas-fir or spruce. There was only slight evidence of 1953 and 1954 feeding.

Discussion

In the current outbreak the area of heaviest infestation lies north and west of the Bechler River. In this area centers of very heavy infestation were observed on the bench-like terrain between the draws and streams. Surrounding the area of heavy damage on all but the south side are lighter areas of infestation. The infestation decreased in intensity as the distance from the heavy centers increases until only the tips of the alpine fir appear to be attacked.

The second area of infestation, lying east of the Bechler River, is smaller and much more lightly infested than the area north of the river. Here the visual evidence of damage is largely the reddened alpine fir leaders except for one small area of heavy sawfly injury in lodgepole pine.

The small area of infestation previously mentioned is the only one located with visual evidence in the lower Bechler Basin. There is some question as to the status of this smaller area because the general appearance was that of thin topped trees with but little red foliage. For this reason it is felt that it may have been evidence of older and possibly non-insect damage that was observed.

The greatest damage is to lodgepole pine. Throughout the infested area alpine fir appears to be lightly attacked, while Douglas-fir, which grows along the margin of some of the heaviest infestation, shows no visual evidence from the air of being attacked.

The general appearance of sawfly feeding in lodgepole pine varies from the characteristic budworm damage in Douglas-fir or alpine fir. While the budworm attacks the leaders and branch tips near the top of the crown, the sawfly infestations in lodgepole pine are characterized by green tips with evidence of defoliation lower in the tree. Because of this characteristic, aerial observation of sawfly damage in lodgepole pine was difficult.

Infestation Trend

The trend of the current sawfly and blackheaded budworm outbreak is unpredictable. Previous outbreaks have always been observed in the better stands lower in the basin and south of Yellowstone Park in the thrifty lodgepole pine stands on the Targhee Forest. The current outbreak, being on higher ground, is in a lodgepole type more typical of the stands throughout Yellowstone Park. A close watch of this outbreak would be advisable. The sawfly epidemic in lodgepole pine does not seem to be serious, since the insect appears to uniformly respect the current year's growth. Therefore the trees should be able to withstand repeated defoliation, unless the sawfly injury is combined with defoliation by other insects or frost damage, which may destroy the current year's growth also.

Previous infestations of the blackheaded budworm in this area have subsided without resorting to chemical control and apparently without serious damage or death to the fir. The present outbreak is certainly not severe, but it should be kept under surveillance to see what its course will be. Parasite cocoons and relatively few pupal shells were in evidence when the ground examination was made and it is entirely possible the epidemic will subside from natural causes.

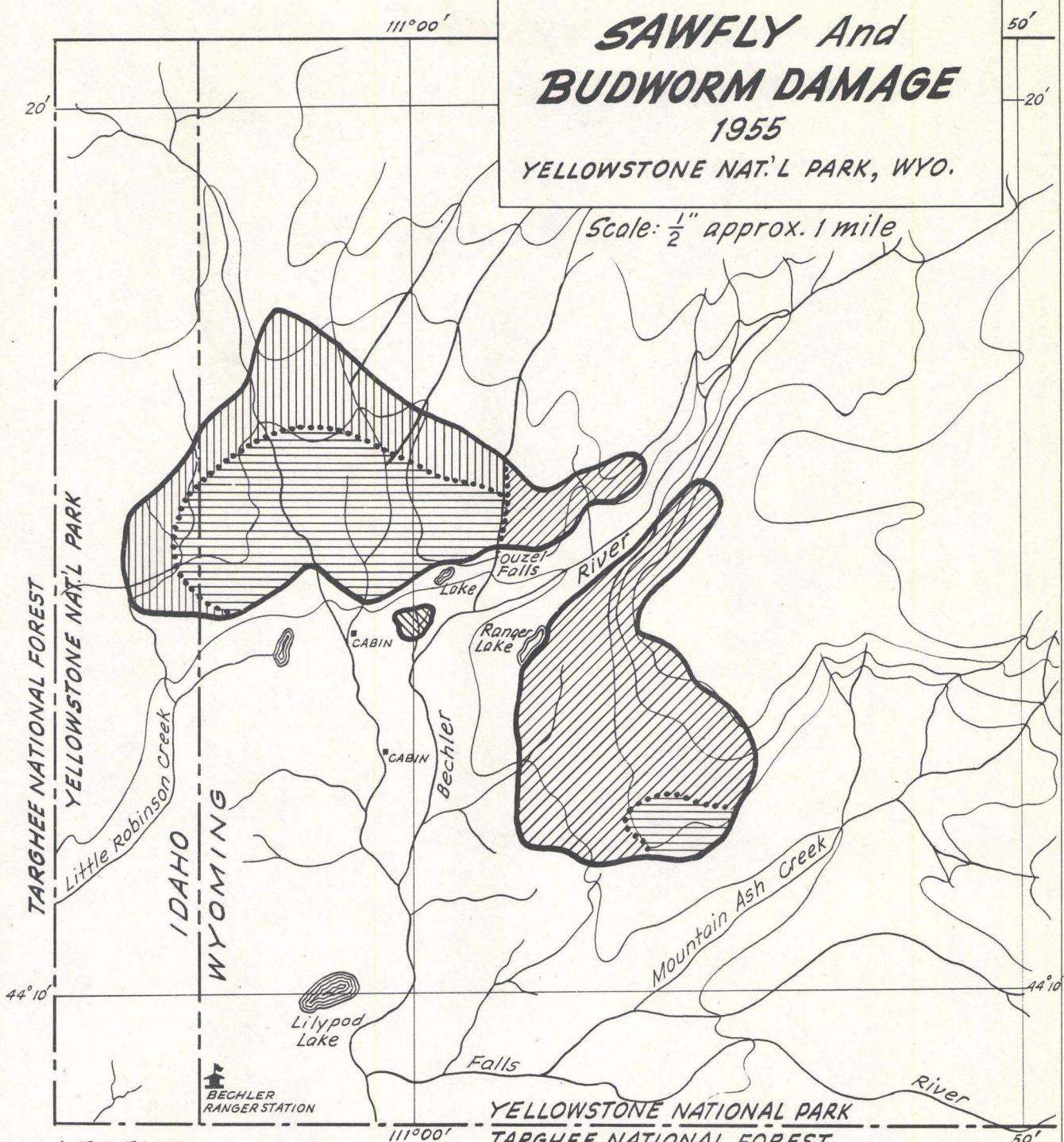
FIGURE: 1

SAWFLY And BUDWORM DAMAGE

1955

YELLOWSTONE NAT'L PARK, WYO.

Scale: $\frac{1}{2}$ " approx. 1 mile



LEGEND

- [Vertical lines] Light damage in Lodgepole pine and Alpine fir
- [Horizontal lines] Centers of heavy Lodgepole pine damage on benches, lighter in canyons
- [Diagonal lines] Alpine fir tips only damage
- [Cross-hatch] Older damage in Lodgepole pine -- Bechler Basin